

Allelopathic Effects of Sandalwood Extract on Seed Germination & Growth of *Triticum Aestivum* (Wheat) Seed

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ABSTRACT: Sandalwood is used as a flavoring agent in cosmetics, but it may be Allelopathic for germination of seeds. An experiment was conducted to determine the effect of Sandalwood extract on wheat seed germination. Sandalwood extract were prepared by using acetone, methanol and distilled water as solvent. Different concentrations (20%, 10%, 1%, 0.5% & 0.25%) were used for the treatment of seeds for different duration. The treated seeds were then taken to test their germination by using blotting paper method (Agarwal, 1980). The well germinated seeds in each concentration were counted after day-1, day-2, day-3, day-4 & day-8 treatment and expressed. The experimented data analyzed that the Sandalwood extract has significant effect on germination of wheat seeds. Interaction of different biochemicals to seeds of different dose level has been resulting the allelopathic effect on germination. As a result the Sandalwood interacts to seeds in the form of allochemicals and showed allelopathic properties that can inhibit the seed germination & their growth.

Key words: Allelopathy, Seedling Growth, Seed Germination, Wheat Seeds, Sandalwood extract.

Objectives

Sandalwood is used as flavoring agent in cosmetics, but it can be Allelopathic for germination of seeds. An experiment was conducted to determine the effect of Sandalwood extract on wheat seed germination.

The experimented data were analyzed that the Sandalwood extract has significant effect on germination of wheat seeds.

INTRODUCTION

One of the oldest incense materials, Sandalwood has been in use for at least 4,000 years. It is one of the most calming incenses and therefore is one of the preferred ones for meditation. It calms the mind, enhances mental clarity, and aids in the opening of the Third Eye. The aroma increases devotion and combined properly can help transmute sexual energy for those who are practicing celibacy. Many ancient Temples and accessories such as rosaries and staffs are made from this wood. If you've read the many statements about Sandalwood, you are familiar with the general opinion that Sandalwood, other than Mysore Sandalwood, is generally considered "inferior." This is a somewhat deceiving statement. Several woods and oils are sold as Sandalwood which are entirely different species altogether. The sandal tree, botanically known as *Santalum Album* belongs to the family Santalaceae.

The Allelopathic effect is a natural interference in which the plant produces substances and metabolites that may benefit or harm other plants/organisms when released (Corsato et al., 2010; Gliessman, 2000), with continuing, increasing use of sandalwood extract in cosmetic, there is renewed interest in determining how /if Allelopathy might be used a possible option to study the beneficial/harmful effect of sandalwood extract on wheat. Cremones et.al (2013) evaluation of the Allelopathic effect of the aqueous extract of physic nut (*Jatropha curcas* L.) leaves on the early development of wild chicory (*Cichorium intybus*) seedlings. Aqueous extract of leaves showed an inhibitory allelopathic effect on the development of wild chicory (sugarloaf variety) which increased with enhanced concentration, presenting negative linear tendency, except for the variable fresh weight of shoots.

The allelopathic influence of aqueous extracts of *Eucalyptus camaldulensis* L. on the germination (%) and seedling growth (fresh and dry weight) of wheat have been determined. The findings indicate physic nut that wheat sown in fields which had leaf litter of *E.camaldulensis* L. will be adversely affected regarding germination, growth and ultimately resulting in lower yields of wheat (Khan et.al 2008).

Mesquite (*Prosopis juliflora*) aqueous leaf extract, were tested for their allelopathic effects on seed germination and radicle length of *Triticum aestivum* var-Lok. Aqueous effect caused pronounced inhibitory effect on seed germination and root length of receptor plant. Seed germination and root length results indicated that the inhibitory effect was proportion to the concentration of the extract. Inhibitory effect was much pronounced radicle length rather than germination. Hence, it could be concluded that the mesquite leaf aqueous extract contain water-soluble allelochemicals. Which could inhibit the seed germination and reduce radicle length of wheat? Siddiqui et al (2009)

weed species viz., *Asphodelus tenuifolius* Cav., *Euphorbia hirta* L., and *Fumaria indica* (Hausk.) Pugsley were used in the form of powder. All the weeds powder treatments showed remarkable varied effects on the plant height and their weights (fresh, dry shoot and root weight) of the test plant. The powder of *Fumaria indica* and *Asphodelus tenuifolius* significantly reduced, while the *Euphorbia hirta* showed non-significant effects on the wheat plant height. Soil containing *Euphorbia hirta* powder showed the significant reduction in the fresh and dry shoot weight of wheat plant. Sandalwood is used as a flavoring agent in cosmetics, but it may be Allelopathic for germination of seeds. The aim of the present study was to determine the effect of Sandalwood extract on wheat seed germination.

MATERIAL AND METHODS

In order to determine the effect of sandalwood (*Santalum Album*) extract on *Triticum aestivum* and seedling growth. The factor included different concentrations of the sandalwood extract (0.25 0.5, 1, 10 and 20 percent) including control. Five grams of Sandalwood powder was dissolved in 50 ml distilled water and was boiled at 100 degree Celsius for 1 hours to get the extract of sandalwood.

In this experiment, 20 seeds of each *Triticum aestivum* were inoculated with different concentrations for 24 hours. After 24 hours, the treated seeds were placed on petridishes. The ratio of 5 different concentrations is added to each petridish. Their solutions were applied where required during the course of experiment. Then, their petridishes were incubated at 20°C and germinated seeds (protrusion of radical by 2 mm) were counted every day up to 8 days. Then percentage of germination was also determined. At the end of test, the length shoot were measured.

RESULTS AND DISCUSSION

Germination percentage of *Triticum aestivum* seeds in control (sandalwood extract concentration of 0%) was significantly higher than that of rest of the concentration of sandalwood extract treatments. While, seed germination of *Triticum aestivum* were stimulated in, 0.25%, 0.5%, 1%, 10% and 20% of sandalwood extract concentrations. However, highest concentration of this extract (20%) has inhibitory effect on seed germination of all wheat species (Tab. 1). Difference of mean germination time of *Triticum aestivum* among control and sandalwood extract treatments were not significant. However, with increasing these extract concentrations, mean germination time at *Triticum aestivum* was significantly increases sandalwood extract treatments were significantly reduced germination rate of *Triticum aestivum* seeds, compared with control. In contrast, difference in germination rate of *Triticum aestivum* in control and sandalwood extract treatments was statistically variable. (Table-1).

It is evident that the Allelopathic effect may benefit or harm other plants/organisms when released (Corsato et al., 2010; Gliessman, 2000). The present study was based on the idea that if allelopathy may be used a possible option to study the beneficial/harmful effect of sandalwood extract on wheat. Cremonez et.al (2013) has evaluated the allelopathic effect of the aqueous extract of physic nut (*Jatropha curcas* L.) leaves showed an inhibitory allelopathic effect on the development of wild chicory (sugarloaf variety) which increased with enhanced concentration, presenting negative linear tendency, except for the variable fresh weight of shoots.

The allelopathic influence of aqueous extracts of *Eucalyptus camaldulensis* L. on the germination (%) and seedling growth (fresh and dry weight) of wheat will be adversely affected regarding germination, growth and which ultimately results in lower yields of wheat (Khan et.al 2008).

Mesquite (*Prosopis juliflora*) aqueous leaf extract, were tested for their allelopathic effects and it was concluded that the mesquite leaf aqueous extract may contain water-soluble allelochemicals Which could inhibit the seed germination and reduce radicle length of wheat (Siddiqui et al (2009).

Our study concluded that with increasing extract concentrations, mean germination time at *Triticum aestivum* was significantly increases sandalwood extract treatments were significantly reduced germination rate of *Triticum aestivum* seeds, compared with control. In contrast, difference in germination rate of *Triticum aestivum* in control and sandalwood extract treatments was statistically variable. (Table-1).

Table 1. Seed germination table of *triticum aestivum* on the effect of sandalwood extract (2nd, 4th and 8th day of germination)

Name of Plant	Conc. In percentage	Percentage of germination	Shoot length of 2 nd Day	4 th Day	8 th Day
Triticum aestivum	Control	90.00	2.2	6	17
	0.25	85.00	2.1	2.5	16
	0.5	80.00	2	4.5	12
	1	55.00	1.3	5	11
	10	40.00	1.2	7	10
	20	30.00	--	6	8

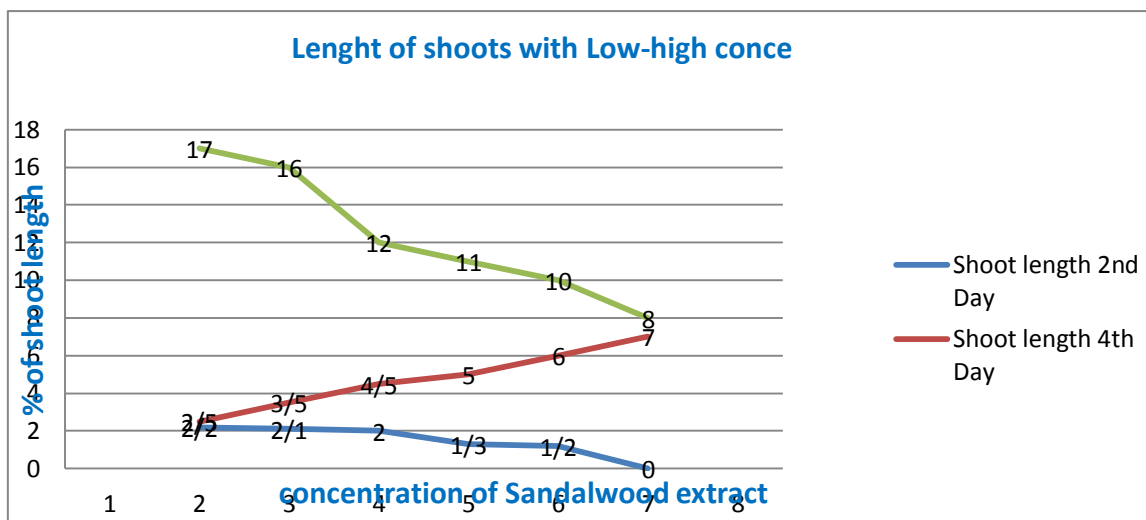
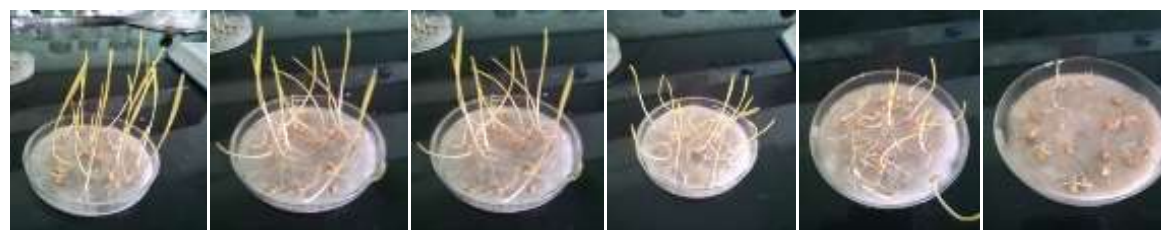


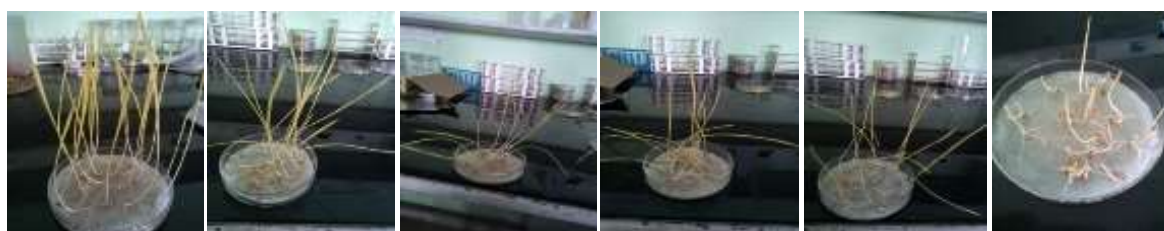
Figure 1



Control conce-0.25% conce-0.5% conce-1% conce-10% conce-20%
Figure 2. Growth of triticum aestivum with different concentration are given below. (2nd day)



Control conce-0.25% conce-0.5% conce-1% conce-10% conce-20%
Figure 3. GROWTH OF Triticum aestivum With Different Concentration Are Given Below. (4th day)



Control conce-0.25% conce-0.5% conce-1% conce-10% conce-20%
Figure 4. Growth of wheat with different concentration are given below. (8th day)

CONCLUSION

The seed germinability and shoot length of *tritium aestivum* were increased when we decreased the concentration sandalwood extract and vice versa.

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